IMPROVEMENTS NEEDED IN PERMITTING CAFOS UNDER THE CLEAN WATER ACT

Prepared for The National Commission on Industrial Farm Animal Production
By Karla A. Raettig, Counsel, Environmental Integrity Project
September 28, 2007

I. Introduction.

Concentrated Animal Feeding Operations (CAFOs) generate massive amounts of manure. According to the USDA, livestock and poultry confinement operations generate about 500 million tons of manure annually.[1] EPA estimates that this is about "3 times more raw waste than is generated by humans in the U.S." Unlike human sewage, however, animal waste is not treated before it is released in to the environment. Instead, producers store liquid manure in large lagoons or holding tanks, until it is pumped, sprayed, injected, or otherwise applied to the land[2] – often on fields without crops or at times of the year when there is no chance of crop uptake.[3] But as very few facilities control enough land to use up their own manure,[4] the industry favors minimal restrictions on storage and land application in order to expedite disposal of as much waste as possible, whenever and wherever possible.[5] While manure has served an agronomically beneficial purpose for thousands of years, transporting manure even short distances is not practical.[6] Concentrated livestock production therefore leads to concentrated manure production, with few places for the manure to go. The result is that manure may be over-applied or simply dumped on the land where it can easily run off into local rivers and streams, discharge through subsurface drainage tiles, or leach into groundwater.

The environmental stakes of regulating factory farms match the scale of factory farming operations themselves. According to EPA, "[i]mproperly managed manure and wastewater from [feeding operations] have been associated with significant environmental and public health concerns, including nutrient over-enrichment of surface water and groundwater, contamination of drinking water supplies and fish kills."[7] In a joint report, EPA and USDA found that the waste generated by hogs, chicken, and cattle has polluted over 35,000 miles of rivers and has contaminated groundwater in 17 states (out of the 22 states reporting animal waste figures).[8] According to EPA, "over-enrichment of waters by nutrients (nitrogen and phosphorous) is the biggest overall source of impairment of the nation's rivers and streams, lakes and reservoirs, and estuaries."[9]

In excess quantities, phosphorus and nitrogen, nutrients found in manure and fertilizer, stimulate nuisance algae growth and deplete oxygen in water, which can be toxic to fish and aquatic life.[10] Fish kills have been caused by a number of different factory farm related pollution events such as discharge or runoff after land application, spills from lagoons, equipment failures, and purposeful dumping.[11] Fish kills are an obvious indicator of more severe water pollution. In many cases, manure spills and pollution from factory farms may not be potent enough to cause a fish kill, but they still result in water quality degradation and harm other aquatic insects and wildlife.

Leaking animal waste storage lagoons threaten human health by contaminating groundwater used for drinking water supplies. For example, Iowa State University scientists studying earthen manure storage structures in Iowa discovered that over one-third of the storage structures

included in the study leak or seep into ground water at rates that exceed Iowa seepage standards.[12]

In addition to drinking water exposures, pathogens from animal manure threaten human health through recreational contact such as swimming in contaminated waters. Again using Iowa as an example, eight of Iowa's thirty-seven state park beaches have been classified as "vulnerable" due to chronic high bacteria levels.[13] Livestock operations are likely contributing to the high bacteria levels at many, if not at all, of these beaches. Moreover, the practice of feeding huge quantities of antibiotics to animals in subtherapeutic doses to promote growth and compensate for crowded conditions has contributed to the rise of bacteria resistance to antibiotics, making it more difficult to treat human diseases.[14] A recent study of state swimming areas in Iowa revealed the presence of potentially dangerous E. coli bacteria that is resistant to common antibiotics.[15]

This contamination poses serious risks to human health. More than 150 pathogens found in livestock manure are associated with risks to humans, including the six human pathogens that account for more than 90%of food and waterborne diseases in humans.[16] Manure-related microbes in water can cause severe gastrointestinal disease, complications and even death.[17] In May 2000 in Walkerton, Ontario, an estimated 2,321 people became ill and seven died after drinking water from a municipal well contaminated with *E.coli* and *Camplyobacter* from runoff resulting from manure spread onto fields by a nearby livestock operation.[18] Manure can also carry arsenic and other toxic metal compounds, as well as antibiotics, into water contributing to antibiotic resistance.[19] Finally, pollution from animal confinements can cause nitrate contamination of drinking water supplies, which can result in significant human health problems including methemoglobinemia in infants ("blue baby syndrome"), spontaneous abortions and increased incidence of stomach and esophageal cancers.[20]

II. Federal Clean Water Act Permitting Program: NPDES

The Clean Water Act legally defines CAFOs as point sources;[21] therefore, CAFOs cannot discharge pollutants into waters of the United States without a NPDES permit.[22] To be considered a CAFO under federal law, a facility must first be defined as an Animal Feeding Operation ("AFO").[23] An AFO is a lot or facility where the following conditions are met: Animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period,[24] and crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility.[25]

Previous EPA regulations, dating back to the mid-1970s, defined AFOs as CAFOs if they confined more than 1,000 animal units.[26] Smaller AFOs that confined 300 to 1,000 animal units were also considered CAFOs if they discharged pollutants through a man-made device or if pollutants were discharged to waters that ran through the facility or otherwise came into contact with the confined animals.[27] AFOs were not CAFOs, however, if they discharged only in a 25-year, 24-hour storm event.[28] EPA could designate an AFO as a CAFO, including those with fewer than 300 animal units, if EPA or an authorized state determined that the AFO was a "significant contributor of pollutants."[29]

EPA adopted new CWA regulations for CAFOs in February 2003.[30] The new rules contain many of the basic features and structure as the old rule with some important exceptions. First, under these new regulations, Large CAFOs, or operations that confine the equivalent of more

than 1,000 animal units (e.g., 1,000 beef cattle, 2,500 swine over 55 lbs; 700 dairy cattle; 30,000 laying hens, etc.) require permits regardless of whether they only discharge in a large storm event.[31] Second, large poultry operations are covered by the new rules, regardless of what type of waste disposal system they use (dry litter operations were previously exempt).[32] Third, all CAFOs must develop and implement a nutrient management plan to ensure the appropriate agricultural utilization of the nutrients when applying waste to cropland.[33] EPA determined that these new rule changes, as well as the other requirements, are economically achievable for CAFOs. EPA's economic analysis shows that this new rule will cause very few CAFOs to experience financial stress.[34]

In Waterkeeper Alliance v. EPA,[35] the United States Court of Appeals for the Second Circuit invalidated certain provisions of the 2003 Rule and remanded several other issues back to EPA for further consideration. The Second Circuit invalidated the 2003 Rule's requirement that all CAFOs with the "potential to discharge" apply for an NPDES permit.[36] In August 2006, EPA issued a proposed rule addressing the issues remanded by the Second Circuit.[37] EPA's 2006 Proposed Rule requires all CAFOs to apply for permits when they "discharge or propose to discharge" pollutants.[38] Thus the proposed regulations cover facilities that discharge and those that are not currently discharging, but will discharge at some time in the future.

III. Effective CWA Permitting for CAFOs

The quality of NPDES permits for CAFOs is highly variable depending on the permitting authority. To improve CAFO NPDES permits, we recommend that EPA set the bar higher by improving its regulations. The following are recommendations to improve the quality of Clean Water Act CAFO permits and thereby protect our nation's health and environment:

1. Establish a Regulatory Presumption that Large CAFOs Discharge

Although there are many problems with the 2006 Proposed Rule, one of the most important fixes EPA can make is to establish a regulatory presumption that Large CAFOs discharge. The 2003 Rule required that all CAFOs with the "potential to discharge" apply for a NPDES permit. While the Second Circuit found this provision inconsistent with the Clean Water Act, the court's decision leaves open a number of options to achieve the purpose of the CAFO rule's duty to apply provision – ensuring that CAFOs are permitted in order to prevent pollution. Specifically, the court strongly suggested that a duty to apply could be supported by a regulatory presumption that all Large CAFOs actually discharge.[39]

The administrative record of the 2006 Proposed Rule supports a presumption by EPA that all Large CAFOs discharge and thus EPA has the authority to require all Large CAFOs to apply for permits. First, Large CAFOs are designed to discharge because EPA's regulations dictate that waste storage structures be designed to achieve zero discharge in rain events up to the 25-year, 24-hour storm.[40] During more severe storm events, however, CAFO waste storage structures actually discharge.[41] Moreover, EPA states that "there are numerous actual documented instances in the administrative record of actual discharges at unpermitted CAFOs that are not associated with the 25-year, 24 hour storms."[42] For example, in Iowa, according to Iowa Department of Natural Resource records, there have been more than 589 documented waste

discharges, including many from waste storage structures and other aspects of the production areas of CAFOs.

EPA's administrative record also supports a presumption that CAFOs utilizing land application actually discharge.[43] As the court stated in its opinion: "The EPA itself states in the Preamble to the Rule that 'the only way to ensure that non-permitted point source discharges of manure, litter, or process wastewaters from CAFOs do not occur is to require…[land application] in accordance with site-specific nutrient management practices.'"[44] Without a nutrient management plan incorporated into a Clean Water Act permit, CAFOs that land apply will discharge and EPA must require them to be permitted.

2. Require strong monitoring, reporting and public notification requirements, including groundwater monitoring around lagoons and surface water monitoring near facilities

Adequate monitoring and reporting requirements are essential for the successful implementation of an NPDES permit. All NPDES permits must specify "[r]equired monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity."[45] Most industries that receive NPDES permits are required to test the receiving waters on a regular basis and report the results to the state or EPA. Yet CAFOs have not been held to this standard--making it difficult, if not impossible, for regulatory agencies to protect surface and groundwater. Discharges from land application areas and manure storage structures have contaminated both groundwater and surface water. Therefore, CAFO NPDES permittees should be required to monitor (1) the manure and wastewater in any storage structures; (2) groundwater; and (3) surface waters that adjoin or pass through the property. Furthermore, the permit should require the CAFO owner or operator to report the results to the permitting agency.

a. Require CAFOs to Analyze Their Waste

Permitting agencies should require CAFOs that have manure storage structures to analyze the waste and wastewater before they submit a permit application. The analysis should include, but not be limited to, all chemical, nutrient, or medicinal inputs used at the facility as well as any potential byproducts and waste products. The results of the waste characterization process should be submitted with the permit application. Permitting agencies should require CAFOs to regularly monitor groundwater and surface water for all constituents of concern identified in the analysis and report the results to the permitting agency. The results of the monitoring will help the facilities and the permitting agency to identify leaking structures and to determine when waste has been over-applied on cropland.

Permitting agencies should require permittees to characterize their waste on a regular basis. If the results of an analysis reveal any new constituents, the permit monitoring requirements should be automatically updated.

b. Require CAFOs to Monitor and Report Liquid Levels in Storage Structures

CAFOs should actively operate and maintain liquid manure storage structures, including solids removal and dewatering, to retain adequate capacity to prevent seepage and overflows.

Recent studies suggest that proper operation and maintenance will prevent most, if not all, discharges from manure storage structures.[46]

c. Require CAFOs to Monitor Groundwater Quality

Discharges to groundwater occur as a result of seepage from manure storage structures and land application fields.[47] NPDES permits should include groundwater monitoring requirements to ensure that CAFOs are not impacting groundwater quality. The placement of monitoring wells should be based on the site-specific hydrogeology of the area surrounding the CAFO. At a minimum, groundwater monitoring wells should be placed upgradient and downgradient of the facility and upgradient and downgradient of each waste storage structure. Wells should be monitored at least twice annually for total coliform, fecal coliform, dissolved solids, nitrates, ammonia and chloride,[48] as well as other contaminants of concern identified through waste characterization.

d. Require CAFOs to Monitor Surface Waters that Adjoin or Run Through the Property

Permitting agencies should require CAFOs to conduct in-stream monitoring of all waters of the state that adjoin or pass through their property, including land application fields. All of the monitoring results should be reported to the permitting agency.

Monitoring locations for streams should be upstream of the CAFO facility, and at the exit point of the stream from the facility, as well as other appropriate locations. The monitoring protocol should include basic parameters such as flow, pH, ammonia, nitrogen as N, Nitrate+Nitrite as N, total phosphorous as P, chloride, temperature, total suspended solids, pathogens and dissolved oxygen, as well as any other contaminants of concern detected by the waste characterization. In addition, the permitting agency should require CAFOs to conduct biological monitoring.

e. Require CAFOs to Monitor Land Application and Production areas

CAFO permits should have monitoring provisions for land application. These should include sampling the CAFO waste to determine available nutrient content before application, and sampling soils at the land application sites to determine soil fertility. Permittees should also be required to monitor the quantity and rate of waste application. In addition, CAFOs should be required to monitor drainage tile discharge points and inspect land application equipment for structural integrity and proper operation.

For the production area, the permit should require installation of devices capable of continuously recording whether any liquids are being discharged from the drain tile outlets and other possible pollutant conveyances. If, at any time during the term of the permit, discharges are recorded, then the permittee should: 1) report such discharges to the state permitting authority, and 2) commence implementing a set of backup discharge monitoring requirements laid out in the permit, to determine whether such discharges contain any pollutants. The list of pollutants to be monitored in the effluent should include, at a minimum, TKN, total phosphorous, orthophosphate, ammonia, BOD5, TSS, TDS, pH, temperature, nitrate, nitrite, total dissolved solids, bicarbonate, chloride, and pathogens. If the pollutant-specific discharge monitoring

reveals the presence of any of these pollutants, at any level, then the permittee should be required to immediately notify the permitting authority of the fact that is has failed to comply with the zero discharge of pollutants requirement in its NPDES permit.

3. Require closure provisions for facilities

Permitting authorities should include closure provision that require CAFOs which cease operation to maintain permit coverage until waste storage structures are properly closed. The permits should also set forth criteria for proper closure.

4. Incorporate Strong Technical Standards and Practices for Nutrient Management

Under federal law, permitting authorities have discretion to set technical standards and best management practices for nutrient management. However, a federal floor should be established as follows:

- Require permittees to identify each waste stream produced at the CAFO. Each waste stream should be analyzed annually for TKN, ammonia, P2O5, and K. Volumetric and tonnage application rates to achieve field/field-section nutrient rates should be based on the most recent waste analysis or analysis determined at the beginning of the crop year and not based on running averages.

- Require permits to include NMP measures that prevent ammonia volatilization and redeposition in nearby surface waters. Approximately 80% of the nitrogen available in manure stored in open lagoons is lost through volatilization.[49] Manure spread on land application areas will demonstrate significant rates of loss when the waste is not injected or immediately incorporated: 100% of ammonium is lost when injected in the fall or not incorporated within five days; the percentage lost declines to 35% when incorporated within one day.[50]

  This volatized ammonia is redeposited, through settling and precipitation, in local waterways, either directly, or as a result of surface runoff.[51] Once in the waterbody, it becomes an available nutrient for plant and algal growth, and contributes to eutrophication.[52] NPDES permits must require the timely incorporation or injection of CAFO waste applied to land application areas, and covers or other measures to reduce ammonia emissions from open manure storage structures or lagoons.

  Moreover, land application of waste should be prohibited in sensitive areas, such as karst topography, sandy soils, floodplains, wetlands, areas that drain into groundwater or drinking water sources, areas close to surface waterbodies, and lands subject to erosion.

- Require that land application rates be based on the most limiting nutrients in the soil (e.g. phosphorous and nitrogen) for each field. The analysis should include the application method, type of crop, realistic crop yields, soil types, slope and erodability of land, and all other nutrient inputs from sources other than manure or wastewater.

- NPDES permits must prohibit application to frozen or snow covered cropland, because it increases the potential for discharges, particularly when snow or ice melts.

- NPDES permits must prohibit the application of waste during precipitation events, because it increases the chances for discharges of sediment and waste. Permitting authorities should also require that land application be delayed if rainfall with the potential to create runoff is forecasted within 24 hours of the planned application.[53] Likewise, permits should prohibit application immediately after precipitation events that saturate soils.

- NPDES permits must prohibit application on slopes that have greater than 4% grade, because the application of manure on steep slopes increases the potential for discharges, even in dry weather.

- Permits should require buffer strips and berms along ecologically sensitive areas.

- NMPs should control pathogen flows to surface and groundwater from land application areas. CAFOs are a leading contributor to impaired water quality throughout the country.[54] According to EPA, pathogens rank second highest in the list of pollutants of concern for rivers and streams, behind siltation and *ahead* of nutrients.[55]

  A significant body of research has concluded that runoff from manure piles and land application can carry pathogens to surface or groundwater through highly permeable soils or drainage tiles.[56] Pathogens have demonstrated the ability to survive in manure storage piles and land application methods.[57] Current manure storage systems, "contain all of the favorable environmental characteristics for pathogen survival and pathogen decrease is particularly slow for some organisms."[58] In order to prevent the dangerous flow of pathogens to surface waters, permits should require the immediate incorporation of broadcast manure and liquid manure waste.[59]

Permitting authorities should ban the construction of new lagoons, because of their surface water, groundwater, and air impacts. Permitting authorities should require existing operations to synthetically line and cover their lagoons. Permits should also require CAFOs to construct berms around existing lagoons in order to retain waste from lagoon overflows. These requirements are important because numerous scientific studies have documented groundwater contamination caused by wastewater seepage from lagoons.[60] Furthermore, significant quantities of hydrogen sulfide, methane, and ammonia are emitted from waste lagoons into the atmosphere.[61]

Where appropriate, permitting authorities should also require CAFOs to install sewage treatment systems. EPA has already recognized that sewage treatment for some CAFOs is both necessary and reasonable. In 2001, EPA required Premium Standard Farms, a hog CAFO in Missouri to construct and install a wastewater treatment system that included the following:[62]

- permeable covers on each lagoon for odor control and gas emissions reduction;
- transfer of the daily inflow (on average) from each existing lagoon to a central nitrification and denitrification system;

- covered anoxic basin (with synthetic liner) for nitrate and biochemical oxygen demand reduction;
- covered aeration basin (with synthetic liner) designed for ammonia conversion to nitrate through nitrification (with recycle to anoxic basin);
- open biosolids storage basin (with clay liner) for settling and further dinitrification;
- open irrigation storage basin (with clay liner) for storage of treated effluent prior to land application.

5. Co-Permitting

Permitting authorities should hold integrators, who exercise substantial operational control, as well as the operators of factory farms, responsible for Clean Water Act compliance through co-permitting. One of the trends in livestock and poultry production is that large corporations, typically large producers or processors, enter into contracts with smaller producers to raise animals to market weight. The corporation often provides the contract farmer with the animals and instructs them on how they must be housed and fed, and the types of antibiotics that will be administered to the animals. The contract farmer provides the land, facilities and labor, and retains ownership of and responsibility for the proper disposal of animal waste. As a result, the large corporations have no incentive to ensure that their contractors are capable of properly disposing of the waste. Co-permitting should apply to producers that own animals, or control how they are raised, as well as the owner or operator of the CAFO who actually raises them. Co-permitting would make the proper disposal of manure the joint responsibility of all entities covered by the permit.

---

[1] U.S. EPA, National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines and Standards for Concentrated Animal Feeding Operations (CAFOs); Final Rule ("2003 CAFO Rule), 66 Fed. Reg. 7176, 7180 (Feb. 12, 2003).

[2] Land application is the primary method of waste disposal with roughly 90 percent of all CAFO-generated waste being applied onto fields. U.S. EPA, State Compendium; Programs and Regulatory Activities Related to Animal Feeding Operations at 13 (May 2002), available at http://www.ars.usda.gov/sp2UserFiles/Place/19020500/PhosphorousImages/compendium.pdf.

[3] Winter application of manure is especially troublesome. See, e.g., Meals, D., Research Shows Winter Application of Manure a Bad Idea, available at http://www.ctic.purdue.edu/partners/112005/rnt.asp ("In University of Vermont studies, winter application of dairy manure resulted in runoff concentrations of nitrogen and phosphorus from two to 15 times higher than those from summer application. Considerable research has demonstrated that runoff from manure application on frozen or snow-covered ground has a high risk of serious water quality impact – and that trusted best management practices (BMPs), including vegetated filter strips, can be of little help in winter.").

[4] For example, of the 12 facilities most recently issued final permits by the Ohio Department of Agriculture, only one indicated in its draft or final permit notice that it would apply waste manure exclusively to its own land. ODA, Livestock Environmental Permitting Program, "Recent Final Permits", available at http://www.ohioagriculture.gov/lepp/lepp-recent.stm.

[5] Bill Weida, formerly an economics professor at Colorado College, has noted: "[P]ollution shopping companies [such as CAFOs] … look for counties or regions where the permitting of potentially polluting activities is easiest and where environmental laws are seldom or loosely enforced." "Pollution Shopping in Rural America: The myth of economic development in isolated regions" (November 16, 2001), available at http://factoryfarm.org/docs/Pollution_Shopping_Update.pdf.

[6] USDA Agriculture Research Service, "National Program 206: Manure and Byproduct Utilization Action Plan" (2005), p. 1 ("Transportation costs inhibit distribution of manure at sites distant from where it is generated. Most manure, therefore, is usually land-applied within about 10 miles of beef cattle feedlots, dairy barns, poultry houses, or swine facilities."), available at http://www.ars.usda.gov/SP2UserFiles/Program/206/206ActionPlan2004/NP206ActionPlanOctober2004Revisedwo

synames.pdf; USDA, "Manure Nutrients Relative to the Capacity of Cropland and Pastureland to Assimilate Nutrients: Spatial and Temporal Trends for the United States", p. 1 (December 2000) ("With fewer, but larger operations, the amount of animal manure has become more concentrated in local areas. Because the distance that manure can be hauled for land application has practical limits, manure loadings per acre must either increase or alternative methods of utilization be adopted."), available at http://www.nrcs.usda.gov/technical/land/pubs/manntr.html.

[7] Statement from U.S. EPA National Agriculture Compliance Assistance Center on best management practices, available at http://www.epa.gov/oecaagct/anafobmp.html.

[8] U.S. EPA and USDA, section 2.2 of "Draft Unified National Strategy for Animal Feeding Operation" (September 11, 1998), available at http://water.usgs.gov/owq/cleanwater/afo/.

[9] U.S. EPA and USDA, "Clean Water Action Plan: Restoring and Protecting America's Waters", at 56 (February 1998), available at http://water.usgs.gov/owq/cleanwater/action/cwap.pdf.

[10] U.S. EPA has identified the pollutants in CAFO waste as: "nutrients (particularly nitrogen and phosphorus), organic matter, solids, pathogens, and odorous/volatile compounds. Animal waste is also a source of salts and trace elements and, to a lesser extent, antibiotics, pesticides, and hormones…..", 2003 CAFO Rule, 68 Fed. Reg. 7176, 7235 (Feb. 12, 2003).

[11] 2003 CAFO Rule, 68 Fed. Reg. at 7236-37 ("Runoff of animal wastes is more likely when rainfall occurs soon after application (particularly if the manure was not injected or incorporated) and when manure is overapplied or misapplied. … Dry weather discharges to surface waters associated with CAFOs have been reported to occur through spills or other accidental discharges from lagoons and irrigation systems, or through intentional releases.").

[12] Glanville, T.D., et al., Measurement of Seepage from Earthen Waste Storage Structures in Iowa, published in Transactions of the ASAE, A Report to the Legislature of the State of Iowa, Iowa State University (Jan. 1999), at 53 and 60.

[13] Iowa Department of Natural Resources Water Fact Sheet 2004-2, Iowa's Beach Monitoring *2003*, (January 2004)

[14] M. Mellon et al., Hogging It – Estimating Antimicrobial Abuse in Livestock, Union of Concerned Scientists, January 2001.

[15] The Associated Press State & Local Wire, Antibiotic Resistant Bacteria Found in Lakes (Aug. 4, 2002).

[16] 2003 CAFO Rule, 68 Fed. Reg. at 7236 ("These organisms are: *Campylobacter spp., Salmonella spp.* (non-typhoid), *Listeria monocytogenes, Escherichia coli* O157:H7, *Cryptosporidium parvum,* and *Giardia lamblia.* All of these organisms may be rapidly transmitted from one animal to another in CAFO settings. An important feature relating to the potential for disease transmission for each of these organisms is the relatively low infectious dose in humans. The protozoan species *Cryptosporidium parvum* and *Giardia lamblia* are frequently found in animal manure. Bacteria such as *Escherichia coli* O157:H7 and *Salmonella spp.* are also often found in livestock manure and have been associated with waterborne disease. The bacteria *Listeria monocytogenes* is ubiquitous in nature and is commonly found in the intestines of wild and domestic animals.").

[17] David Wallinga, M.D., Institute for Agriculture and Trade Policy, "Concentrated Animal Feeding Operations: Health Risks from Water Pollution", (November 2004), available at http://www.iatp.org/iatp/publications.cfm?accountID=421&refID=37390.

[18] Id.

[19] Id. see e.g., Chapin, et al., "Airborne Multidrug-Resistant Bacteria Isolated from a Concentrated Swine Feeding Operation", 113 Environmental Health Perspectives 137 (February 2005), available at http://www.ehponline.org/members/2004/7473/7473.pdf.

[20] U.S. EPA, 2003 CAFO Rule, at 7238; see also U.S. E.P.A, Office of Children's Health Protection, "Drinking Water Contaminants—America's Children and the Environment: A First View of Available Measures", available at http://yosemite.epa.gov/ochp/ochpweb.nsf/content/drinking_water_contam.htm; Centers for Disease Control and Prevention, "Spontaneous Abortions Possibly Related to Ingestion of Nitrate-Contaminated Well Water -- La Grange County, Indiana 1991-1994", Morbidity and Mortality Weekly, Report 45 (26) (1996), at 569-571 (linking high nitrate levels in Indiana well water near confinement operations to spontaneous abortions in humans), available at http://www.cdc.gov/mmwr/PDF/wk/mm4526.pdf.

[21] 33 U.S.C. § 502(14).

[22] Id. § 402(a).

[23] 40 C.F.R. § 122.23(b)(2).

[24] Id. § 122.23(b)(1)(i).

[25] Id. § 122.23(b)(1)(ii).

[26] Id. § 122.23(b)(3).

[27] Id. § 122.23(c)(2).

[28] Id. § 122.23(b)(3).
[29] Id. § 122.23(b)(3).
[30] 2003 CAFO Rule, 68 Fed. Reg. at 7176.
[31] 40 C.F.R. § 122.23(b)(4).
[32] Id.
[33] Id. § 122.42(e).
[34] 2003 CAFO Rule, 68 Fed. Reg. at 7246-47. EPA estimates that approximately 3 percent of all Large CAFOs and about 4 percent of all affected small business CAFOs nationwide may be vulnerable to closure.
[35] Waterkeeper Alliance v. EPA, 399 F.3d 486 (2d Cir. 2005).
[36] Waterkeeper at 505-06
[37] U.S. EPA, Revised National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitation Guidelines for Concentrated Animal Feeding Operations in Response to Waterkeeper Decision; Proposed Rule, 71 Fed. Reg. 37744, 37774 (2006).
[38] 40 C.F.R. § 122.21(a).
[39] Waterkeeper at 506, n. 22.
[40] 40 C.F.R. §412.31(a) (1).
[41] See EPA Br. at 89-90 fn 39, 93; Env. Pet. Reh'g Br. at 9.
[42] 68 Fed. Reg. 7201.
[43] See EPA Br. at 8-9, 27, 28 fn 14, 71, 87, 89, fn 38; Env. Pet. Reh'g Br. at 9; Env. Pet. Reply Br. at 1-10 and Env. Pet. Opening Br. at 9-15.
[44] Waterkeeper at 27, citing 68 Fed. Reg. 7198.
[45] 40 C.F.R. § 122.48(b).
[46] 2003 CAFO Rule at 7215.
[47] Miner, J.R., Humenik, F. J., Overcash, M.R., Managing Livestock Wastes to Preserve Environmental Quality, Iowa State Press (2000). Seepage from land application to groundwater can occur when over application increases nitrogen loss to groundwater.
[48] U.S. EPA, National Pollutant Discharge Elimination System Permit Regulation and Effluent Limitations Guidelines and Standards for Concentrated Animal Feeding Operations, Proposed Rules, 66 Fed. Reg. 2960 and 3144 (Jan. 12, 2001).
[49] See, e.g., Jackson, LL, et al., at 208.
[50] Ketterings, Quirine M., et al., Nitrogen Guidelines for Field Crops in New York, Cornell University Dep't of Crop and Soil Sciences Extension Series E03-16 (2003) at 10. See also, Lorimor, Jeffrey, Ammonia Losses from Broadcast Liquid Manure, Iowa State University.
[51] See Knowlton, Katharine, Ammonia Emissions – The Next Regulatory Hurdle for Dairy Farmers.
[52] See Meisinger, John J., Nitrogen Loss Measurements Following Field Application of Manure.
[53] U.S. EPA, Final Internal Review Draft: Guidance Manual and Sample NPDES Permit for Concentrated Animal Feeding Operations, Appendix F: sample CAFO NPDES Permit, (Sept. 21, 2000).
[54] EPA, National Water Quality Inventory, 2000 at ch. 2, p. 13-14.
[55] Id. at p.15.
[56] See Sobsey, M.D., Pathogens in Animal Wastes and the Impacts of Waste Management Practices on Their Survival, Transport and Fate; see also Minnesota Planning Agency Environmental Quality Board, "Final Generic Environmental Impact Statement on Animal Agriculture, Soil and Manure Issues: Technical Work Paper: Effect of animal agriculture on soil in Minnesota," ("Minnesota GEIS") June 2001, at 53.
[57] Id.
[58] Id. at 54
[59] See Soupir, Michelle, et al., Bacteria Release and Transport from Livestock Manure Applied to Pastureland, ASAE Meeting Paper No. 032149 (2003).
[60] Environmental Integrity Project, Threatening Iowa's Future:Iowa's Failure to Implement and Enforce the Clean Water Act for Livestock Operations (May 2004), at 10 available at http://environmentalintegrity.org/pub194.cfm
[61] Iowa State University, Air Quality Study, at 42.
[62] Citizens Legal Environmental Action Network, Inc. v. Premium Standard Farms, Inc., Civ. Act. No. 97-6073-CV-SJ-6 (U.S. Dist. W. D. Mo. 2001), available at http://es.epa.gov/oeca/ore/water/psf.html.